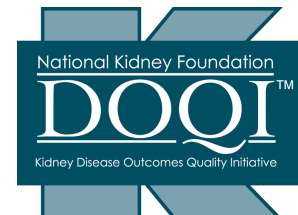
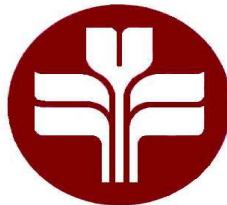


Chronic Kidney Disease: Proposed Revisions to the ICD-9-CM Classification

Lesley Stevens MD

Tufts-New England Medical Center

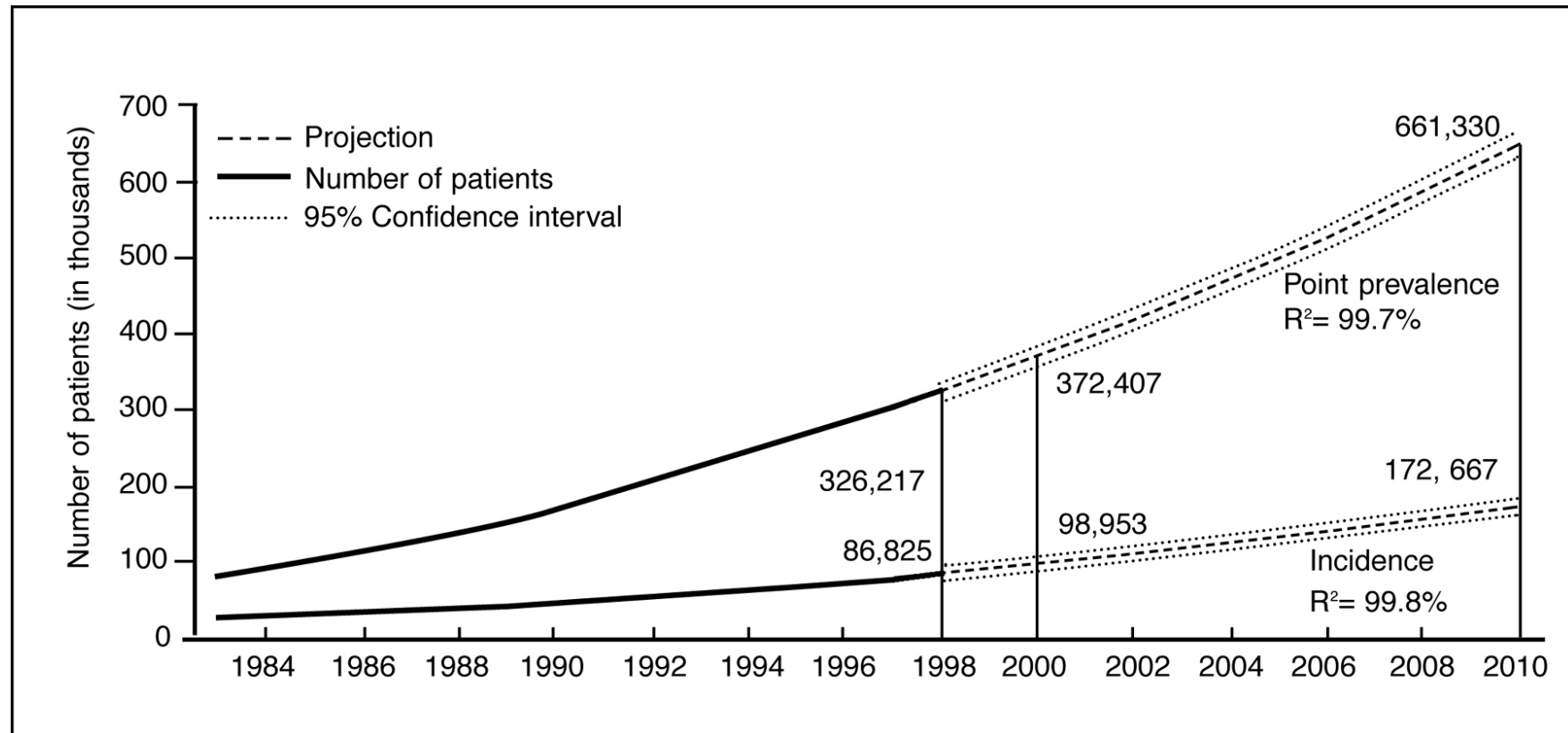
National Kidney Foundation



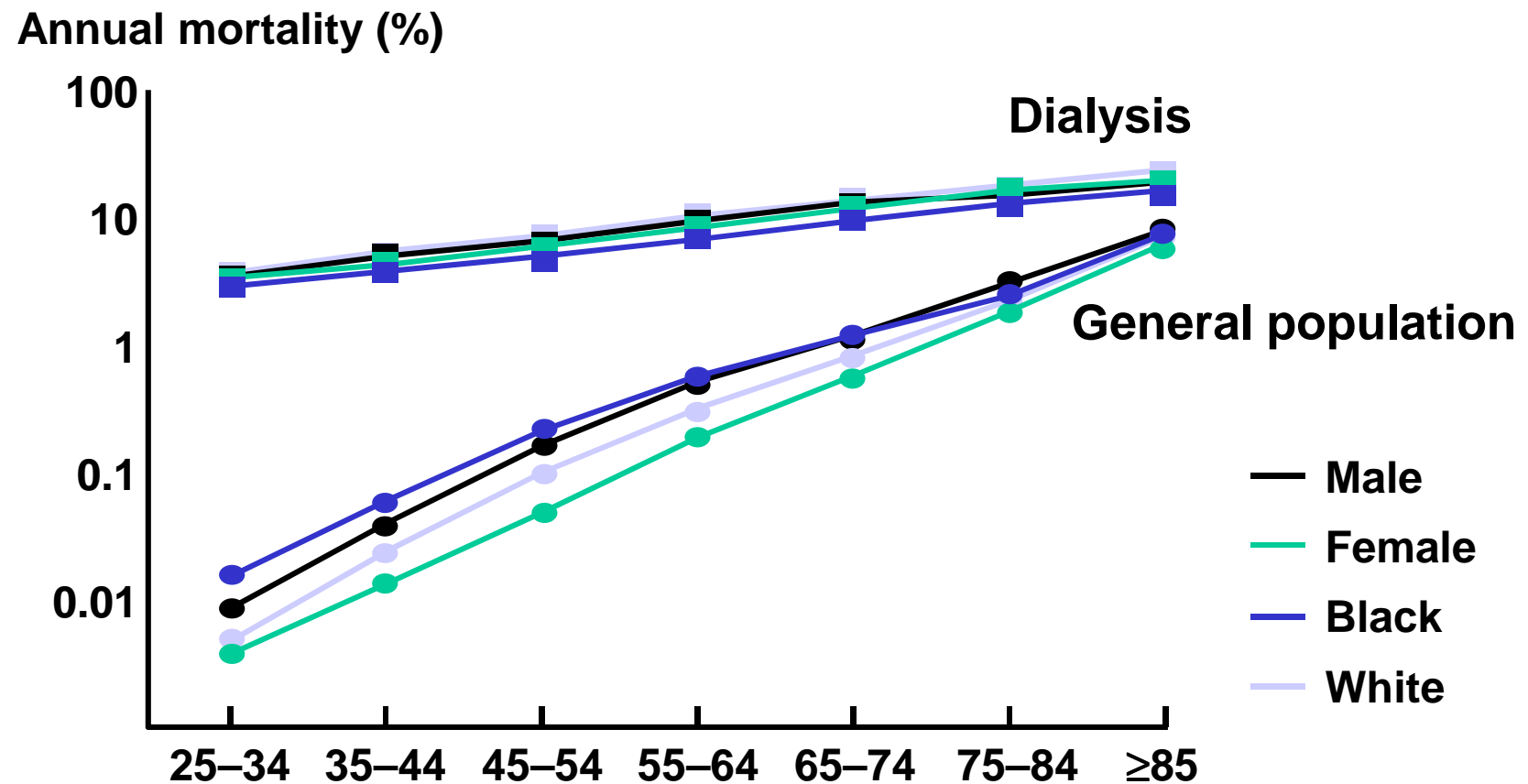
Objectives

- Kidney Failure
- Stages of Chronic Kidney Disease
- Definition and Classification of CKD
 - GFR
 - Proteinuria
 - Etiology
- Current use of ICD-9-CM codes for CKD
- Proposed changes to ICD-9-CM

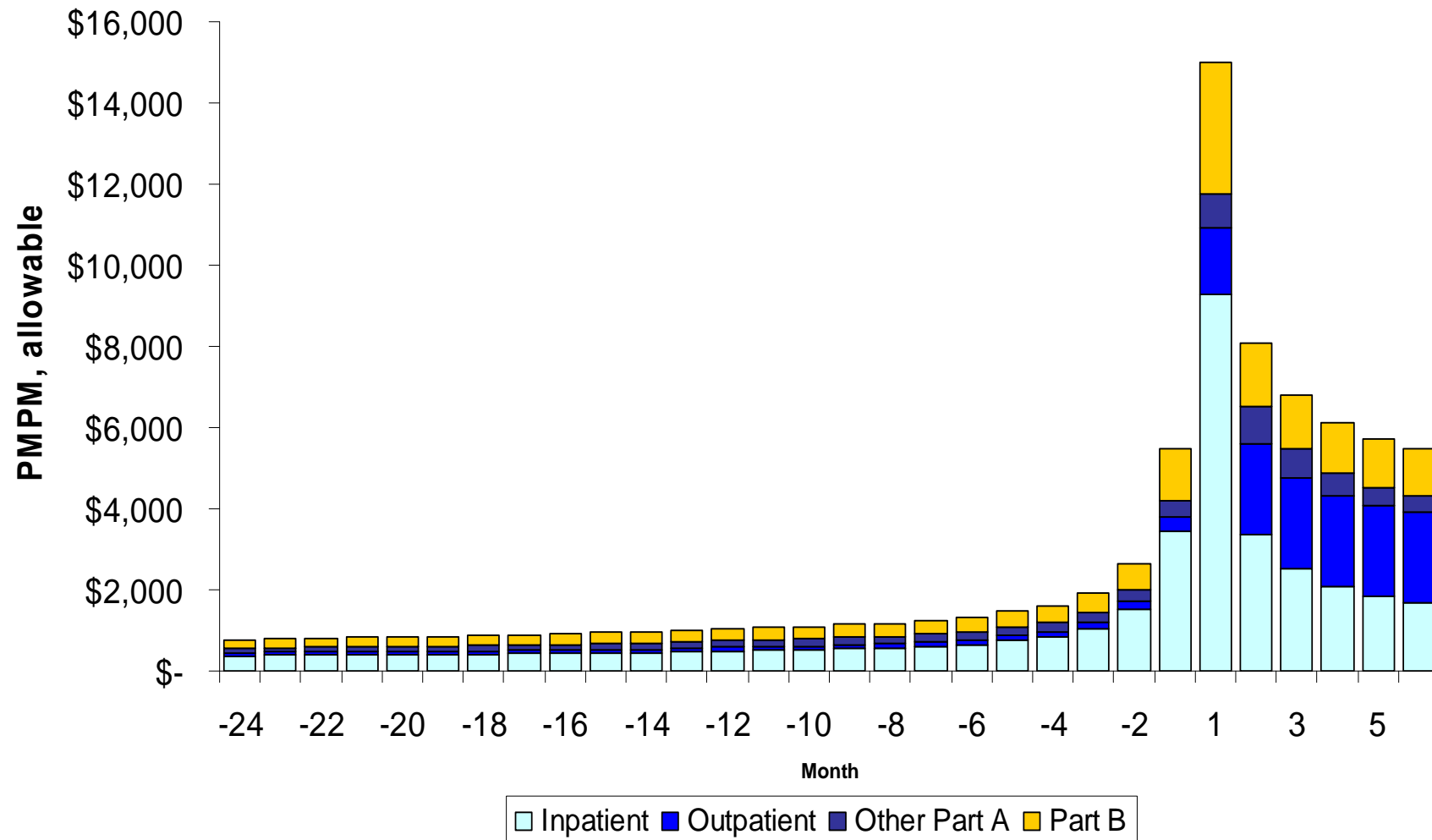
Incidence and Prevalence of End-Stage Renal Disease in the US



Cardiovascular Mortality in the General Population and in ESRD Treated by Dialysis

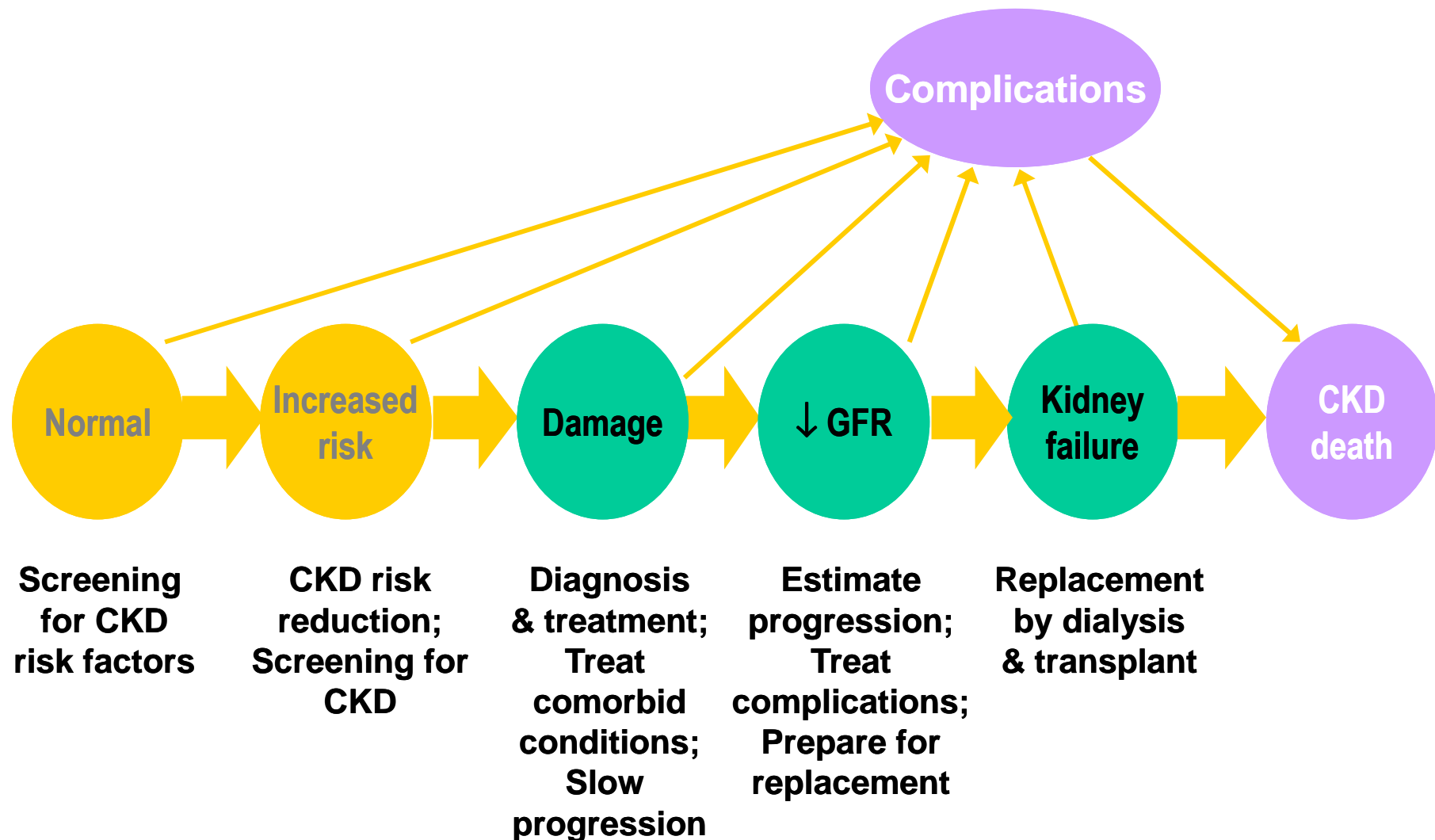


Costs of Associated with Initiation of Dialysis



St Peters, Khan, Ebben. Li, Xue, Pereira, Collins. Kidney Int. 200.

Stages in Progression of Chronic Kidney Disease and Therapeutic Strategies



Definition of CKD

Structural or functional abnormalities of the kidneys for ≥ 3 months, as manifested by either:

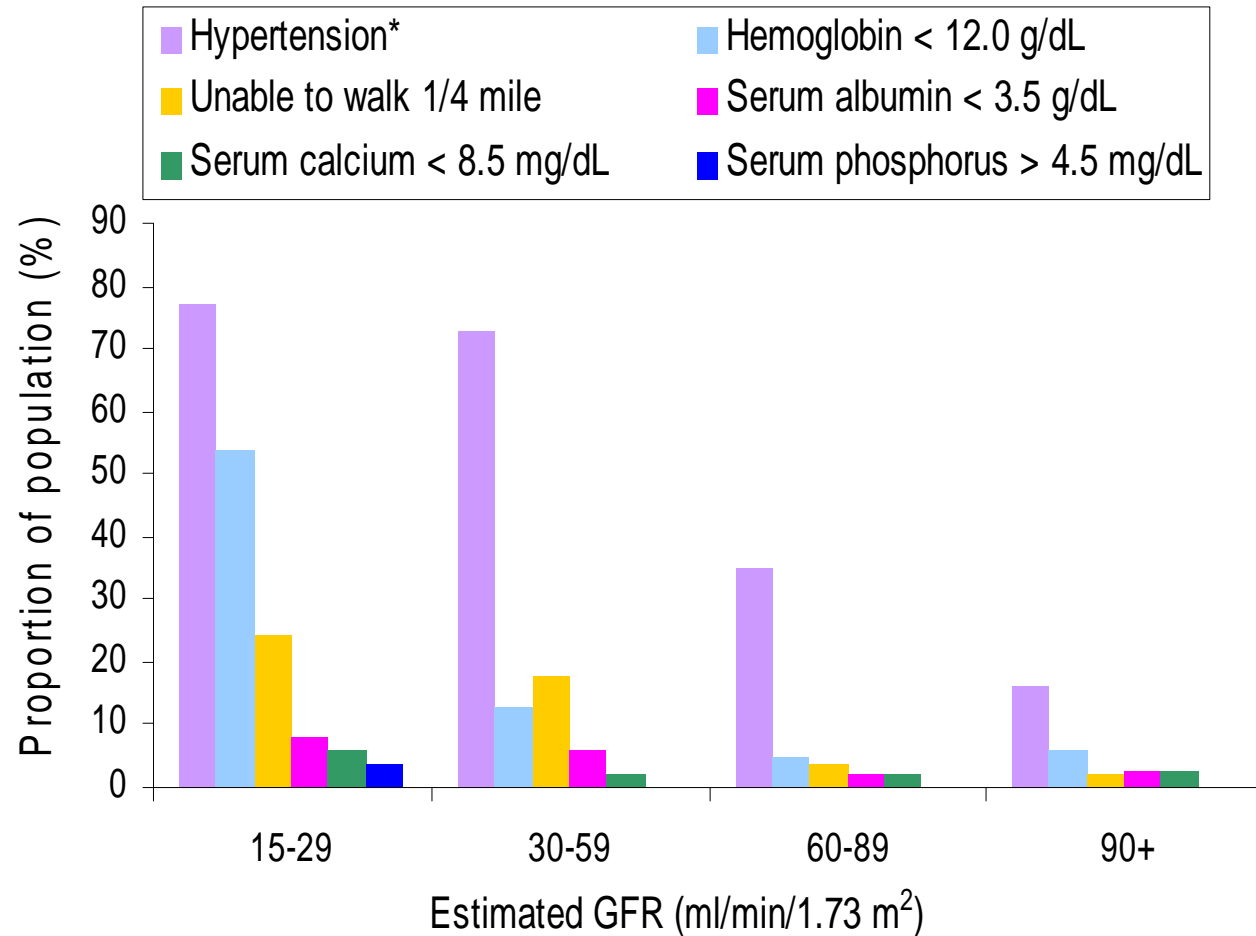
1. Kidney damage, with or without decreased GFR, as defined by
 - pathologic abnormalities
 - markers of kidney damage, including abnormalities in the composition of the blood or urine or abnormalities in imaging tests
2. GFR < 60 ml/min/1.73 m², with or without kidney damage

Prevalence of CKD and Estimated Number of Adults with CKD in the US (NHANES 88-94)

Stage	Description	GFR (ml/min/1.73 m ²)	Prevalence*	
			N (1000s)	%
1	Kidney Damage with Normal or ↑ GFR	≥ 90	5,900	3.3
2	Kidney Damage with Mild ↓ GFR	60-89	5,300	3.0
3	Moderate ↓ GFR	30-59	7,600	4.3
4	Severe ↓ GFR	15-29	400	0.2
5	Kidney Failure	< 15 or Dialysis	300	0.1

*Stages 1-4 from NHANES III (1988-1994). Population of 177 million with age ≥20. Stage 5 from USRDS (1998), includes approximately 230,000 patients treated by dialysis, and assuming 70,000 additional patients not on dialysis. GFR estimated from serum creatinine using MDRD Study equation based on age, gender, race and calibration for serum creatinine. For Stage 1 and 2, kidney damage estimated by spot albumin-to-creatinine ratio ≥17 mg/g in men or ≥25 mg/g in women in two measurements.

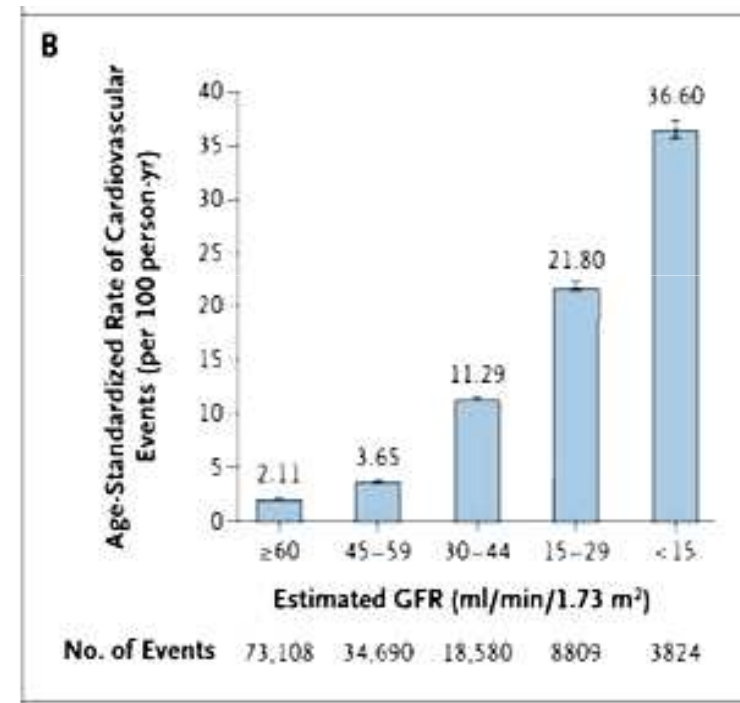
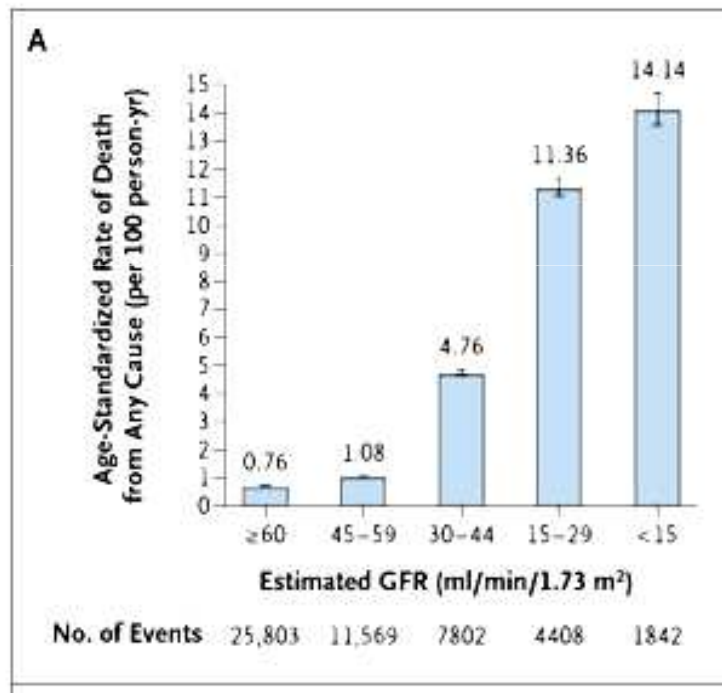
Prevalence of Abnormalities at each level of GFR



*>140/90 or antihypertensive medication

p-trend < 0.001 for each abnormality

Age-Standardized Rates of Death from Any Cause (Panel A) and Cardiovascular Events (Panel B), According to the Estimated GFR among 1,120,295 Ambulatory Adults



Go, A, et al. NEJM 351: 1296

Clinical Practice Guidelines for the Detection, Evaluation and Management of CKD

Stage	Description	GFR	Evaluation	Management
	At increased risk		Test for CKD	Risk factor management
1	Kidney damage with normal or ↑ GFR	>90	Diagnosis Comorbid conditions CVD and CVD risk factors	Specific therapy, based on diagnosis Management of comorbid conditions Treatment of CVD and CVD risk factors
2	Kidney damage with mild ↓ GFR	60-89	Rate of progression	Slowing rate of loss of kidney function ¹
3	Moderate ↓ GFR	30-59	Complications	Prevention and treatment of complications
4	Severe ↓ GFR	15-29		Preparation for kidney replacement therapy Referral to Nephrologist
5	Kidney Failure	<15		Kidney replacement therapy
¹ Target blood pressure less than 130/80 mm Hg. Angiotension converting enzyme inhibitors (ACEI) or angiotension receptor blocker (ARB) for diabetic or non-diabetic kidney disease with spot urine total protein-to-creatinine ratio of greater than 200 mg/g.				

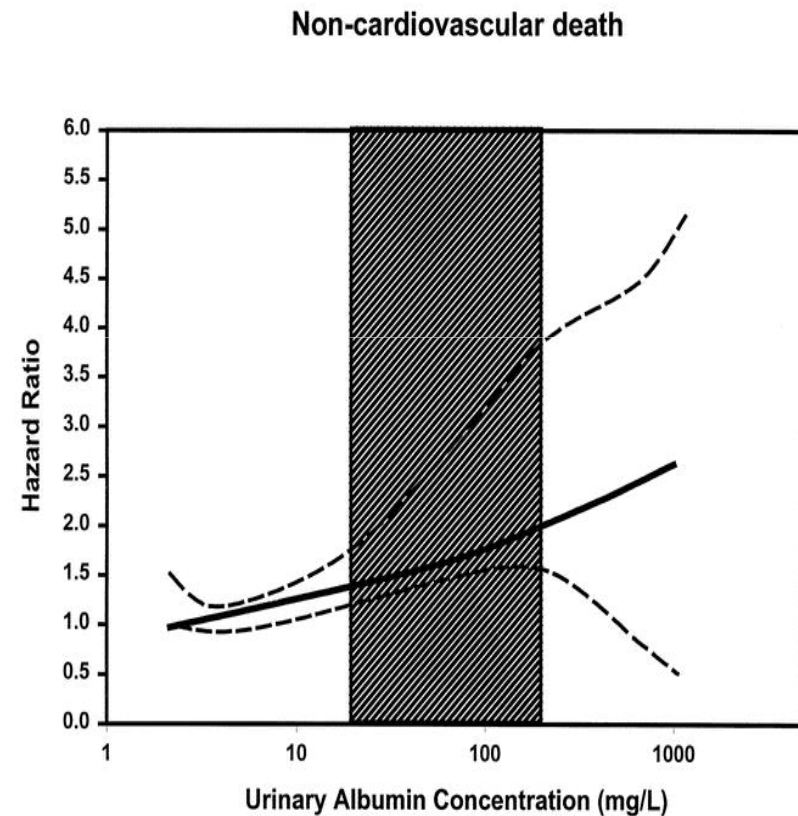
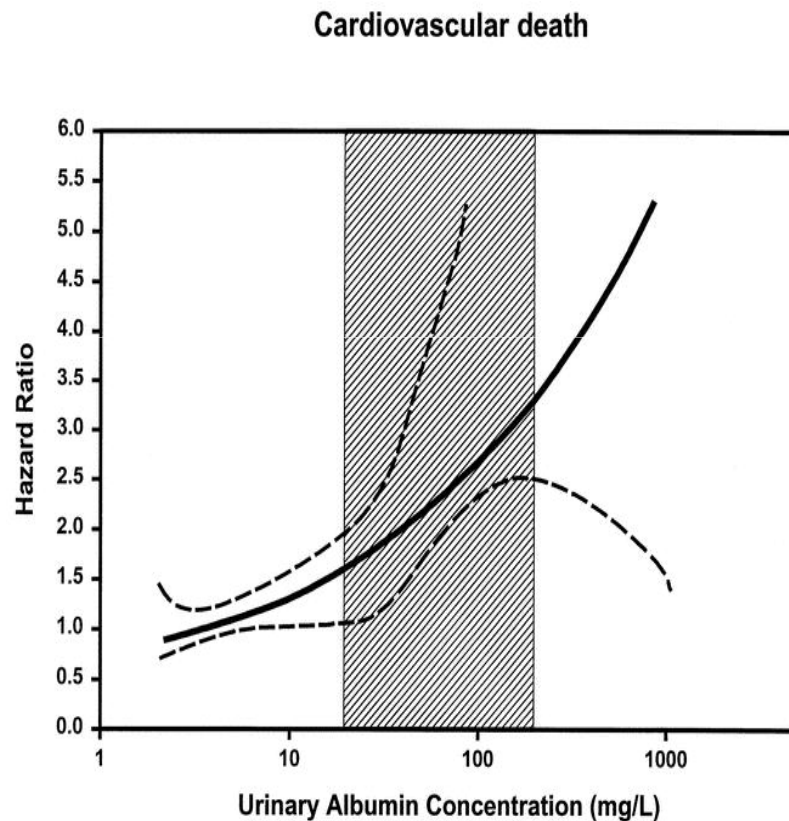
Definition of ESRD vs Kidney Failure

- ESRD is a federal government defined term that indicates chronic treatment by dialysis or transplantation
- Kidney Failure: $\text{GFR} < 15 \text{ ml/min/1.73 m}^2$ or on dialysis.

Importance of Proteinuria in CKD

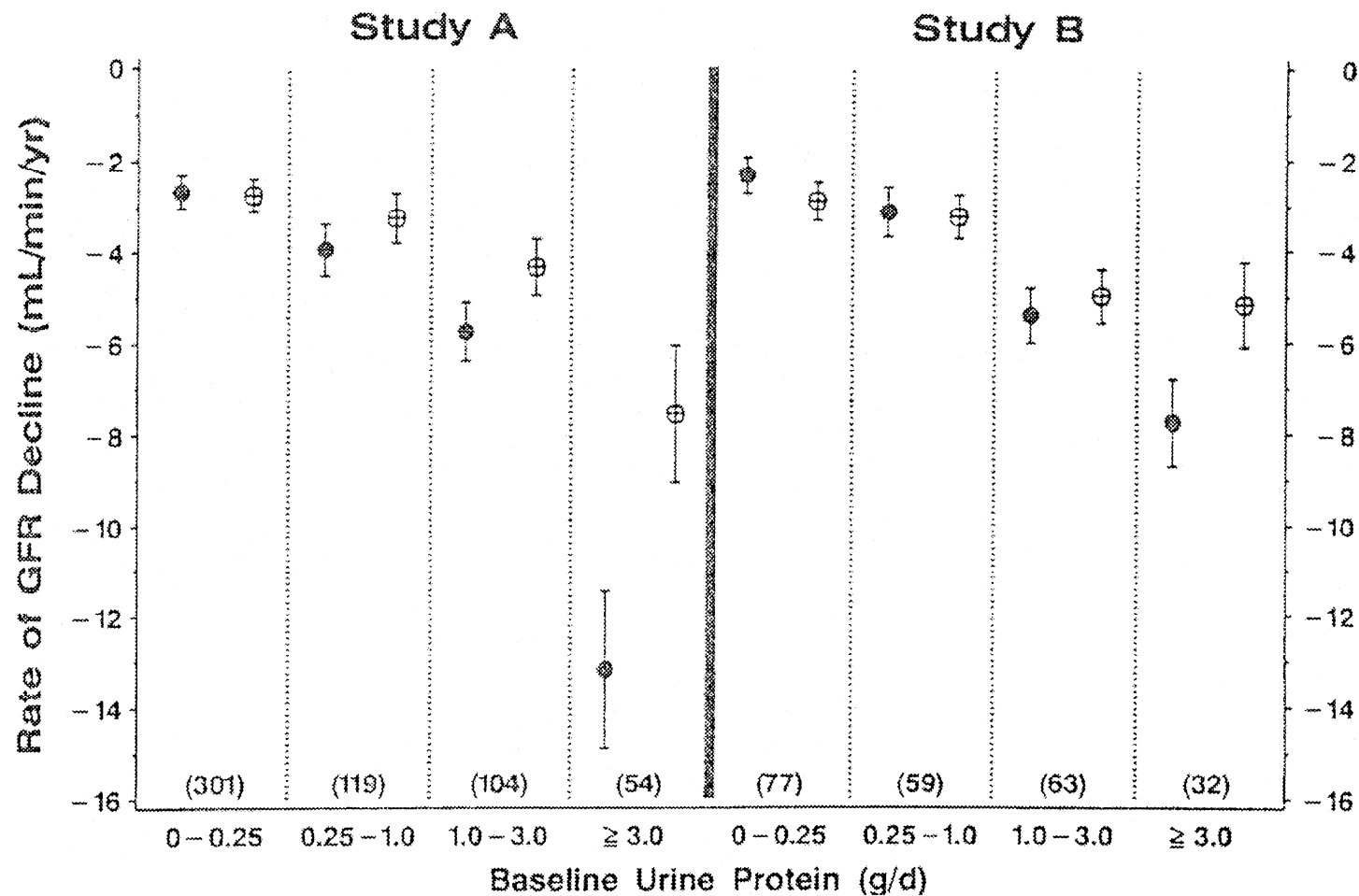
Interpretation	Explanation
Marker of kidney damage	Spot urine albumin-to-creatinine ratio >30 mg/g or spot urine total protein-to-creatinine ratio >200 mg/g for ≥ 3 months defines CKD
Clue to the type (diagnosis) of CKD	Spot urine total protein-to-creatinine ratio >500-1000 mg/g suggests diabetic kidney disease, glomerular diseases, or transplant glomerulopathy.
Risk factor for adverse outcomes	Higher proteinuria predicts faster progression of kidney disease and increased risk of CVD.
Effect modifier for interventions	Strict blood pressure control and ACE inhibitors are more effective in slowing kidney disease progression in patients with higher baseline proteinuria.
Hypothesized surrogate outcomes and target for interventions	If validated, then lowering proteinuria would be a goal of therapy.

Albuminuria as a Risk Factor for CVD in PREVEND



Hillege HL et al. Circulation 2002; 106: 1777-1782

Progression of Kidney Disease related to level of proteinuria and blood pressure lowering in MDRD Study



Petersen. Annals of Internal Medicine. 1995

Clinical Practice Guidelines for Management of Hypertension in CKD

Type of Kidney Disease	Blood Pressure Target (mm Hg)	Preferred Agents for CKD, with or without Hypertension	Other Agents to Reduce CVD Risk and Reach Blood Pressure Target
Diabetic Kidney Disease	<130/80	ACE inhibitor or ARB	Diuretic preferred, then BB or CCB
Nondiabetic Kidney Disease with Urine Total Protein-to-Creatinine Ratio ≥ 200 mg/g			
Nondiabetic Kidney Disease with Spot Urine Total Protein-to-Creatinine ratio < 200 mg/g		None preferred	Diuretic preferred, then ACE inhibitor, ARB, BB or CCB
Kidney Disease in Kidney Transplant Recipient			CCB, diuretic, BB, ACE inhibitor, ARB

Classification of CKD by Diagnosis

- **Diabetic Kidney Disease**
- **Glomerular diseases** (autoimmune diseases, systemic infections, drugs, neoplasia)
- **Vascular diseases** (renal artery disease, hypertension, microangiopathy)
- **Tubulointerstitial diseases** (urinary tract infection, stones, obstruction, drug toxicity)
- **Cystic diseases** (polycystic kidney disease)
- **Diseases in the transplant** (Allograft nephropathy, drug toxicity, recurrent diseases, transplant glomerulopathy)

Current use of ICD-9-CM codes for Kidney Disease

- ICD-9-CM codes for kidney disease were used in 1% of all patients.

GFR	Sensitivity	Specificity
30-59	6	97
< 30	39	96

* GFR in ml/min/1.72 m²

Current use of '585' (chronic renal failure) in 277, 262 adults visiting an outpatient commercial clinical laboratory

	GFR (ml/min/1.73 m ²)*				
	>90	60-89	30-59	15-29	<15
No 585 code**	13	60	27	3	<1
585 code	10	62	23	2	<1

* GFR in ml/min/1.72 m²

**Row Percentages

Proposed Classification: ESRD code

585 End Stage Renal Disease;
 on dialysis

585.1 End Stage Renal Disease;
 transplanted

Use additional code to identify
chronic kidney disease (586.1-586.9)

Proposed Classification: CKD code

- 586.1 Stage I CKD: Kidney damage with normal or increased glomerular filtration rate (GFR), greater than or equal to 90 ml/min/1.73m²
- 586.2 Stage II CKD: Kidney damage with mild decrease in GFR 60-89 ml/min/1.73m²
- 586.3 Stage III CKD: ~~Kidney damage with~~ moderate decrease in GFR 30-59 ml/min/1.73m²
- 586.4 Stage IV CKD: ~~Kidney damage with~~ severe decrease in GFR 15-29 ml/min/1.73m²
- 586.5 Stage V CKD: ~~Kidney damage with GFR of less than 15 ml/min/1.73m²~~ Kidney failure with GFR less than 15 ml/min/1.73m² and not on dialysis

Note: Codes apply only to patients diagnosed kidney disease > 3 mo

Proposed Classification: CKD code 5th digit

- Each 586 (CKD) code requires a 5th digit to indicate evidence of proteinuria or albuminuria
 - 586.X0 for those without evidence of proteinuria or albuminuria
 - 586.X1 for those with evidence of proteinuria or albuminuria

Proposed Classification: Etiology

- Instructions to code for CKD stage along with disease specific codes

250.4 Diabetes with renal manifestations

Use additional code to identify manifestation, as:
Add chronic kidney disease (585.1-585.9)

582.81 Chronic glomerulonephritis in diseases
classified elsewhere: amyloidosis, SLE

Use additional code to identify manifestation, as:
Add chronic kidney disease (585.1-585.9)

Benefits of Revised ICD-9-CM codes

1. Distinguish between ESRD and CKD; between dialysis and transplantation
2. Assess risk for adverse outcomes, expected complications and comorbid disease by the combination of severity of CKD (stages), proteinuria and diagnosis
3. Determine which patients require specific treatments based on severity of CKD, and in particular proteinuria
4. Examine of health care utilization and costs. Assess rural and urban settings and racial disparities
5. Assess quality of care delivered
6. Progress toward achievement of Healthy People 2010 goals
7. Allow CMS and USRDS to develop specific research files to investigators to enhance our knowledge of CKD by the major risk groups